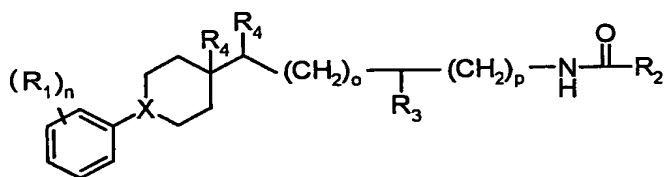


Claims

1. A compound of structural formula (I):



(I)

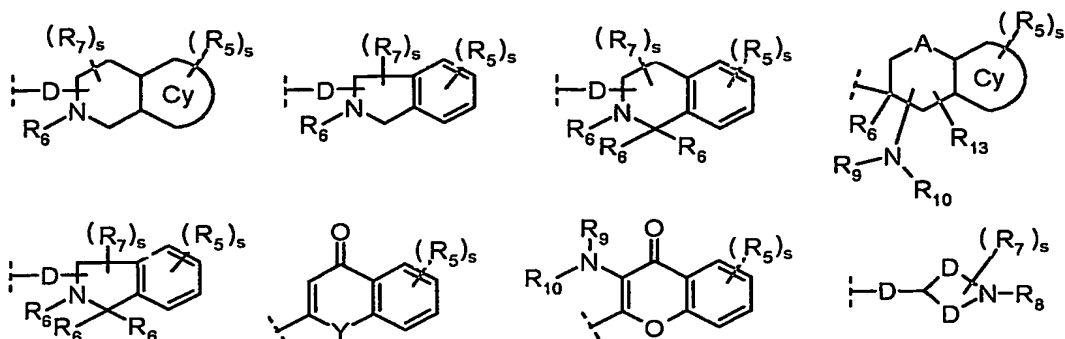
or a pharmaceutically acceptable salt or a solvate thereof, wherein

R_1 is independently:

hydrogen,
hydroxy,
cyano,
nitro,
halo,
alkyl,
alkoxy,
haloalkyl,
(D)-C(O) R_{15} ,
(D)-C(O)OR $_{15}$,
(D)-C(O)SR $_{15}$,
(D)-C(O)-heteroaryl,
(D)-C(O)-heterocyclyl,
(D)-C(O)N(R_{15}) $_2$,
(D)-N(R_{15}) $_2$,
(D)-NR $_{15}$ COR $_{15}$,

(D)-NR₁₅CON(R₁₅)₂,
(D)-NR₁₅C(O)OR₁₅,
(D)-NR₁₅C(R₁₅)=N(R₁₅),
(D)-NR₁₅C(=NR₁₅)N(R₁₅)₂,
(D)-NR₁₅SO₂R₁₅,
(D)-NR₁₅SO₂N(R₁₅)₂,
(D)-NR₁₅(D)-heterocyclyl,
(D)-NR₁₅(D)-heteroaryl,
(D)-OR₁₅,
OSO₂R₁₅,
(D)-[O]_v(C₃ - C₇ cycloalkyl),
(D)-[O]_v(D)aryl,
(D)-[O]_v(D)-heteroaryl,
(D)-[O]_v(D)-heterocyclyl (wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen when v=1),
(D)-SR₁₅,
(D)-SOR₁₅,
(D)-SO₂R₁₅ or
(D)-SO₂N(R₁₅)₂,
wherein alkyl, alkoxy, cycloalkyl, aryl, heterocyclyl and heteroaryl are unsubstituted or substituted;

R₂ is:



R₃ is independently:

(D)-aryl or

(D)-heteroaryl,

wherein aryl and heteroaryl are unsubstituted or substituted;

R₄ is H or a bond;

each R₅ is independently:

hydrogen,

halo,

alkyl,

haloalkyl,

hydroxy,

alkoxy,

S-alkyl,

SO₂-alkyl,

O-alkenyl

S-alkenyl

NR₁₅C(O)R₁₅,

NR₁₅SO₂R₁₅,

$N(R_{15})_2$,

(D)-cycloalkyl or

(D)-aryl (wherein aryl is phenyl or naphthyl),

(D)-heteroaryl or

(D)-heterocyclyl (wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen), and

wherein aryl, heteroaryl, heterocyclyl, alkyl or cycloalkyl is unsubstituted or substituted, and two adjacent R_5 may form a 4- to 7-membered ring;

each R_6 is independently:

hydrogen,

alkyl,

C(O)-alkyl,

(D)-aryl or

cycloalkyl;

each R_7 is independently:

hydrogen,

alkyl,

(D)-aryl,

(D)-heteroaryl,

(D)- $N(R_9)_2$,

(D)- $NR_9C(O)$ alkyl,

(D)- NR_9SO_2 alkyl,

(D)- $SO_2N(R_9)_2$,

(D)-(O)_r alkyl,

(D)-(O)_r(D)- NR_9COR_9 ,

(D)-(O)_r(D)- $NR_9SO_2R_9$,

(D)-(O)_r-heterocyclyl or

(D)-(O)_r(alkyl)-heterocyclyl;

each R₈ is independently:

hydrogen,
alkyl,
(D)-aryl,
C(O) alkyl,
C(O)-aryl,
SO₂-alkyl or
SO₂-aryl;

R₉ and R₁₀ are each independently:

hydrogen,
alkyl or
cycloalkyl, or

R₉ and R₁₀ together with the nitrogen to which they are attached form a 5- to 8-membered ring optionally containing an additional heteroatom selected from O, S and NR₆,

wherein alkyl and cycloalkyl are unsubstituted or substituted;

R₁₃ is:

hydrogen or
alkyl;

each R₁₅ is independently:

hydrogen,
alkyl,
haloalkyl,
(D)-cycloalkyl,
(D)-aryl (wherein aryl is phenyl or naphthyl),
(D)-heteroaryl or

(D)-heterocyclyl,

wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen, and wherein aryl, heteroaryl, heterocyclyl, alkyl and cycloalkyl is unsubstituted or substituted;

Cy is:

aryl,

5- or 6-membered heteroaryl,

5- or 6-membered heterocyclyl or

5- or 7-membered carbocyclyl;

A is a bond, O, S(O)_u, NR₈ or CH₂;

D is a bond or alkylene;

X is N or CH;

Y is O or NR₉;

n is 1 - 4;

o is 0 - 2;

p is 0 - 2;

r is 0 or 1;

s is 0 - 5;

u is 0 - 2;

v is 0 or 1.

2. The compound of claim 1, wherein

each R₁ is independently:

hydrogen,

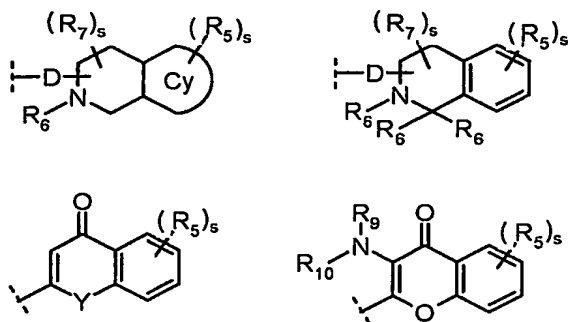
hydroxy,

cyano,

nitro,

halo,
 alkyl,
 alkoxy,
 haloalkyl,
 $(D)-N(R_{15})_2$,
 $(D)-NR_{15}COR_{15}$,
 $(D)-NR_{15}CON(R_{15})_2$,
 $(D)-NR_{15}C(O)OR_{15}$,
 $(D)-NR_{15}C(R_{15})=N(R_{15})$,
 $(D)-NR_{15}C(=NR_{15})N(R_{15})_2$,
 $(D)-NR_{15}SO_2R_{15}$,
 $(D)-NR_{15}SO_2N(R_{15})_2$ or
 (D) -heterocyclyl;

R_2 is:



R_3 is (CH_2) -phenyl or (CH_2) -naphthyl, unsubstituted or substituted with one to three substituents selected from the group consisting of cyano, nitro, perfluoroalkoxy, halo, alkyl, (D) -cycloalkyl, alkoxy and haloalkyl;

each R_5 is independently:

hydrogen,

halo,
alkyl,
haloalkyl,
hydroxy,
alkoxy,
S-alkyl,
SO₂-alkyl,
O-alkenyl or
S-alkenyl;

each R₆ is independently:

hydrogen or
alkyl;

each R₇ is independently:

alkyl,
hydrogen,
(D)-aryl,
(D)-heteroaryl,
(D)-N(R₉)₂,
(D)-NR₉C(O)alkyl or
(D)-NR₉SO₂alkyl;

R₉ and R₁₀ are each independently:

hydrogen,
alkyl or
cycloalkyl, or

R₉ and R₁₀ together with the nitrogen to which they are attached form a 5- to 7-membered ring optionally containing an additional heteroatom selected from O, S and NR₆;

each R₁₁ is independently:

alkyl,
OR₁₂,
(D)-aryl,
(D)-cycloalkyl,
(D)-heteroaryl or
halo;

each R₁₂ is independently

hydrogen,
(D)-aryl or
alkyl;

each R₁₃ is independently:

hydrogen or
C₁ - C₄ alkyl;

R₁₄ is independently selected from the group consisting of:

hydrogen,
halo,
alkyl,
(D)-cycloalkyl,
alkoxy or
phenyl;

R₁₅ is independently:

hydrogen,
halo,
alkyl,

(D)-cycloalkyl,
alkoxy or
phenyl;

Cy is selected from aryl, 5- or 6-membered heteroaryl, 5- or 6-membered heterocyclyl or 5- to 7-membered carbocyclyl;

A is a bond or CH₂;

D is a bond or CH₂;

Y is NR₉ or O;

n is 0, 1 or 2;

o is 0 or 1;

p is 0 or 1;

s is 0 – 3

v is 0 or 1.

3. The compound of claim 1 or 2, wherein

each R₁ is independently:

cyano,

nitro,

halo,

alkyl,

(D)-heterocyclyl,

(D)-N(R₁₅)₂,

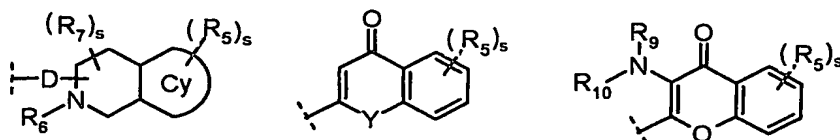
(D)-NR₁₅COR₁₅,

(D)-NR₁₅CON(R₁₅)₂,

(D)-NR₁₅C(O)OR₁₅ or

(D)-NR₁₅SO₂R₁₅;

R₂ is:



R₃ is (CH₂)-phenyl or (CH₂)-naphthyl, substituted with one or two substituents selected from the group consisting of perfluoroalkoxy, halo, alkyl, alkoxy and haloalkyl;

each R₅ is independently:

hydrogen,
halo,
alkyl,
hydroxy,
S-alkyl,
SO₂-alkyl or
alkoxy;

R₆ is hydrogen;

R₇ is hydrogen;

R₉ and R₁₀ are each independently:

hydrogen or
alkyl, or

R₉ and R₁₀ together with the nitrogen to which they are attached form a 5- to 6-membered ring optionally containing an additional oxygen atom;

R₁₂ is hydrogen or (D)-aryl

each R₁₃ is independently:

hydrogen,
methyl or
ethyl;

R₁₄ is independently:

hydrogen,
halo,
alkyl,
alkoxy or
phenyl;

R₁₅ is independently:

hydrogen,
halo,
alkyl,
alkoxy or
phenyl;

Cy is:

aryl or
heteroaryl;

D is a bond;

n is 1 or 2;

o is 0;

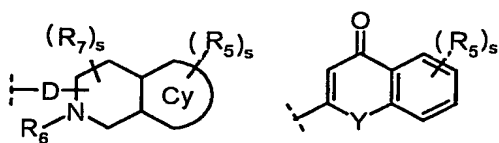
p is 0;

s is 0 - 2.

4. The compound of claim 1, 2 or 3 wherein

R_1 is (D)-heterocyclyl;

R_2 is:



R_3 is (CH₂)-phenyl or (CH₂)-naphthyl, unsubstituted or substituted with one or two halogen atoms;

each R_5 is independently:

hydrogen,
isopropyl,
hydroxy,
alkoxy,
S-alkyl or
SO₂-alkyl;

R_6 is hydrogen;

R_7 is hydrogen;

R_9 and R_{10} are each independently:

hydrogen or

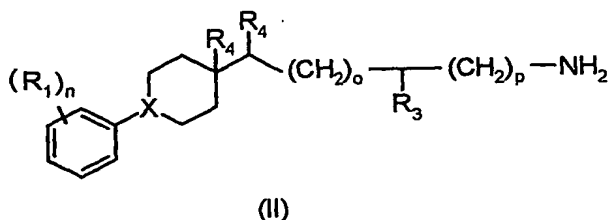
alkyl, or

R_9 and R_{10} together with the nitrogen to which they are attached form a 5- to 6-membered ring optionally containing an additional oxygen atom;

Cy is benzene;

s is 0 or 1.

5. An intermediate compound of structural formula (II)



wherein X, R_1 , R_3 , R_4 , n, o and p are as defined in claim 1.

6. The compound of any of claims 1 to 5 for use as a medicament.
7. Use of the compound of any of claims 1 to 5 for the preparation of a medicament for the treatment or prevention of disorders, diseases or conditions responsive to the inactivation or activation of the melanocortin-4 receptor in a mammal.
8. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of cancer cachexia.

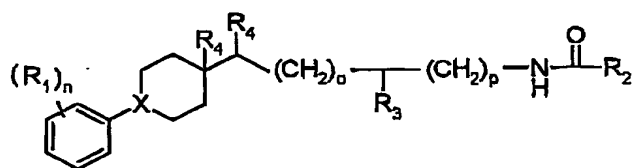
9. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of muscle wasting.
10. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of anorexia.
11. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of anxiety and/or depression.
12. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of obesity.
13. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of diabetes mellitus.
14. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of male or female sexual dysfunction.
15. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of erectile dysfunction.
16. A pharmaceutical composition which comprises a compound of any of claims 1 to 5 and a pharmaceutically acceptable carrier.

AMENDED CLAIMS

[received by the International Bureau on 12 July 2004 (12.07.04);
original claims 1-16 replaced by amended claims 1-15]

New Claims 1 - 15

1. A compound of structural formula (I):



(I)

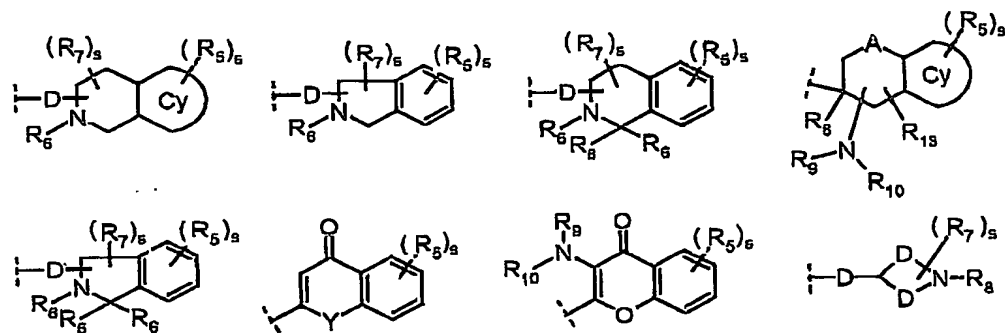
or a pharmaceutically acceptable salt or a solvate thereof, wherein

R₁ is independently:

hydrogen,
hydroxy,
cyano,
nitro,
halo,
alkyl,
alkoxy,
haloalkyl,
(D)-C(O)R₁₅,
(D)-C(O)OR₁₅,
(D)-C(O)SR₁₅,
(D)-C(O)-heteroaryl,

(D)-C(O)-heterocyclyl,
 (D)-C(O)N(R₁₅)₂,
 (D)-N(R₁₅)₂,
 (D)-NR₁₅COR₁₅,
 (D)-NR₁₅CON(R₁₅)₂,
 (D)-NR₁₅C(O)OR₁₅,
 (D)-NR₁₅C(R₁₅)=N(R₁₅),
 (D)-NR₁₅C(=NR₁₅)N(R₁₅)₂,
 (D)-NR₁₅SO₂R₁₅,
 (D)-NR₁₅SO₂N(R₁₅)₂,
 (D)-NR₁₅(D)-heterocyclyl,
 (D)-NR₁₅(D)-heteroaryl,
 (D)-OR₁₅,
 OSO₂R₁₅,
 (D)-[O]_v(C₃ - C₇ cycloalkyl),
 (D)-[O]_v(D)aryl,
 (D)-[O]_v(D)-heteroaryl,
 (D)-[O]_v(D)-heterocyclyl (wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen when v=1),
 (D)-SR₁₅,
 (D)-SOR₁₅,
 (D)-SO₂R₁₅ or
 (D)-SO₂N(R₁₅)₂,
 wherein alkyl, alkoxy, cycloalkyl, aryl, heterocyclyl and heteroaryl are unsubstituted or substituted;

R₂ is:



R₃ is independently:

(D)-aryl or

(D)-heteroaryl,

wherein aryl and heteroaryl are unsubstituted or substituted;

R₄ is H or a bond;

each R₅ is independently:

hydrogen,

halo,

alkyl,

haloalkyl,

hydroxy,

alkoxy,

S-alkyl,

SO₂-alkyl,

O-alkenyl

S-alkenyl

NR₁₅C(O)R₁₅,

NR₁₅SO₂R₁₅,

N(R₁₅)₂,

(D)-cycloalkyl or

(D)-aryl (wherein aryl is phenyl or naphthyl),

(D)-heteroaryl or

(D)-heterocyclyl (wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen), and

wherein aryl, heteroaryl, heterocyclyl, alkyl or cycloalkyl is unsubstituted or substituted, and two adjacent R₅ may form a 4- to 7-membered ring;

each R₆ is independently:

hydrogen,

alkyl,

C(O)-alkyl,

(D)-aryl or

cycloalkyl;

each R₇ is independently:

hydrogen,

alkyl,

(D)-aryl,

(D)-heteroaryl,

(D)-N(R₉)₂,

(D)-NR₉C(O) alkyl,

(D)-NR₉SO₂ alkyl,

(D)-SO₂N(R₉)₂,

(D)-(O)_r alkyl,

(D)-(O)_r(D)-NR₉COR₉,
(D)-(O)_r(D)-NR₉SO₂R₉,
(D)-(O)_r-heterocyclyl or
(D)-(O)_r(alkyl)-heterocyclyl;

each R₈ is independently:

hydrogen,
alkyl,
(D)-aryl,
C(O) alkyl,
C(O)-aryl,
SO₂-alkyl or
SO₂-aryl;

R₉ and R₁₀ are each independently:

hydrogen,
alkyl or
cycloalkyl, or

R₉ and R₁₀ together with the nitrogen to which they are attached form a 5- to 8-membered ring optionally containing an additional heteroatom selected from O, S and NR₆,

wherein alkyl and cycloalkyl are unsubstituted or substituted;

R₁₃ is:

hydrogen or
alkyl;

each R₁₅ is independently:

hydrogen,
alkyl,

haloalkyl,
(D)-cycloalkyl,
(D)-aryl (wherein aryl is phenyl or naphthyl),
(D)-heteroaryl or
(D)-heterocyclyl,
wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen,
and wherein aryl, heteroaryl, heterocyclyl, alkyl and cycloalkyl is
unsubstituted or substituted;

Cy is:

aryl,
5- or 6-membered heteroaryl,
5- or 6-membered heterocyclyl or
5- or 7-membered carbocyclyl;

A is a bond, O, S(O)_u, NR_g or CH₂;

D is a bond or alkylene;

X is N or CH;

Y is O or NR_g;

n is 1 - 4;

o is 0 - 2;

p is 0 - 2;

r is 0 or 1;

s is 0 - 5;

u is 0 - 2;

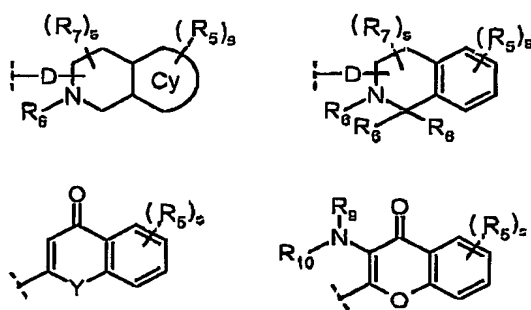
v is 0 or 1.

2. The compound of claim 1, wherein

each R₁ is independently:

hydrogen,
hydroxy,
cyano,
nitro,
halo,
alkyl,
alkoxy,
haloalkyl,
(D)-N(R₁₅)₂,
(D)-NR₁₅COR₁₅,
(D)-NR₁₅CON(R₁₅)₂,
(D)-NR₁₅C(O)OR₁₅,
(D)-NR₁₅C(R₁₅)=N(R₁₅),
(D)-NR₁₅C(=NR₁₅)N(R₁₅)₂,
(D)-NR₁₅SO₂R₁₅,
(D)-NR₁₅SO₂N(R₁₅)₂ or
(D)-heterocyclyl;

R₂ is:



R₃ is (CH₂)-phenyl or (CH₂)-naphthyl, unsubstituted or substituted with one to three substituents selected from the group consisting of cyano, nitro, perfluoroalkoxy, halo, alkyl, (D)-cycloalkyl, alkoxy and haloalkyl;

each R₅ is independently:

- hydrogen,
- halo,
- alkyl,
- haloalkyl,
- hydroxy,
- alkoxy,
- S-alkyl,
- SO₂-alkyl,
- O-alkenyl or
- S-alkenyl;

each R₆ is independently:

- hydrogen or
- alkyl;

each R₇ is independently:

- alkyl,
- hydrogen,
- (D)-aryl,
- (D)-heteroaryl,
- (D)-N(R₉)₂,
- (D)-NR₉C(O)alkyl or
- (D)-NR₉SO₂alkyl;

R₉ and R₁₀ are each independently:

hydrogen,

alkyl or

cycloalkyl, or

R₉ and R₁₀ together with the nitrogen to which they are attached form a 5- to 7-membered ring optionally containing an additional heteroatom selected from O, S and NR₆;

each R₁₁ is independently:

alkyl,

OR₁₂,

(D)-aryl,

(D)-cycloalkyl,

(D)-heteroaryl or

halo;

each R₁₂ is independently

hydrogen,

(D)-aryl or

alkyl;

each R₁₃ is independently:

hydrogen or

C₁ - C₄ alkyl;

R₁₄ is independently selected from the group consisting of:

hydrogen,

halo,

alkyl,

(D)-cycloalkyl,

alkoxy or

phenyl;

R₁₅ is independently:

hydrogen,
halo,
alkyl,
(D)-cycloalkyl,
alkoxy or
phenyl;

Cy is selected from aryl, 5- or 6-membered heteroaryl, 5- or 6-membered heterocyclyl or 5- to 7-membered carbocyclyl;

A is a bond or CH₂;

D is a bond or CH₂;

Y is NR₉ or O;

n is 0, 1 or 2;

o is 0 or 1;

p is 0 or 1;

s is 0 – 3

v is 0 or 1.

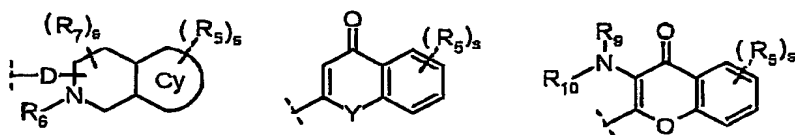
3. The compound of claim 1 or 2, wherein

each R₁ is independently:

cyano,
nitro,
halo,

alkyl,
 (D)-heterocyclyl,
 (D)-N(R₁₅)₂,
 (D)-NR₁₅COR₁₅,
 (D)-NR₁₅CON(R₁₅)₂,
 (D)-NR₁₅C(O)OR₁₅ or
 (D)-NR₁₅SO₂R₁₅;

R₂ is:



R₃ is (CH₂)-phenyl or (CH₂)-naphthyl, substituted with one or two substituents selected from the group consisting of perfluoroalkoxy, halo, alkyl, alkoxy and haloalkyl;

each R₅ is independently:

hydrogen,
 halo,
 alkyl,
 hydroxy,
 S-alkyl,
 SO₂-alkyl or
 alkoxy;

R₆ is hydrogen;

R₇ is hydrogen;

R₉ and R₁₀ are each independently:

hydrogen or

alkyl, or

R₉ and R₁₀ together with the nitrogen to which they are attached form a 5- to 6-membered ring optionally containing an additional oxygen atom;

R₁₂ is hydrogen or (D)-aryl

each R₁₃ is independently:

hydrogen,

methyl or

ethyl;

R₁₄ is independently:

hydrogen,

halo,

alkyl,

alkoxy or

phenyl;

R₁₅ is independently:

hydrogen,

halo,

alkyl,

alkoxy or

phenyl;

Cy is:

aryl or

heteroaryl;

D is a bond;

n is 1 or 2;

o is 0;

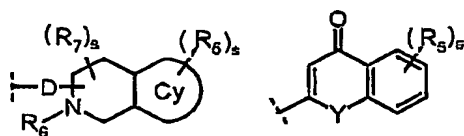
p is 0;

s is 0 - 2.

4. The compound of claim 1, 2 or 3 wherein

R₁ is (D)-heterocyclyl;

R₂ is:



R₃ is (CH₂)-phenyl or (CH₂)-naphthyl, unsubstituted or substituted with one or two halogen atoms;

each R₅ is independently:

hydrogen,

isopropyl,

hydroxy,

alkoxy,

S-alkyl or

SO₂-alkyl;

R₆ is hydrogen;

R₇ is hydrogen;

R₉ and R₁₀ are each independently:

hydrogen or

alkyl, or

R₉ and R₁₀ together with the nitrogen to which they are attached form a 5- to 6-membered ring optionally containing an additional oxygen atom;

Cy is benzene;

s is 0 or 1.

5. The compound of any of claims 1 to 4 for use as a medicament.
6. Use of the compound of any of claims 1 to 4 for the preparation of a medicament for the treatment or prevention of disorders, diseases or conditions responsive to the inactivation or activation of the melanocortin-4 receptor in a mammal.
7. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of cancer cachexia.
8. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of muscle wasting.

9. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of anorexia.
10. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of anxiety and/or depression.
11. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of obesity.
12. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of diabetes mellitus.
13. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of male or female sexual dysfunction.
14. Use according to claim 6 for the preparation of a medicament for the treatment or prevention of erectile dysfunction.
15. A pharmaceutical composition which comprises a compound of any of claims 1 to 4 and a pharmaceutically acceptable carrier.